Artham
Resource Material

EXEMPLAR
SOLUTIONS
MATH'S
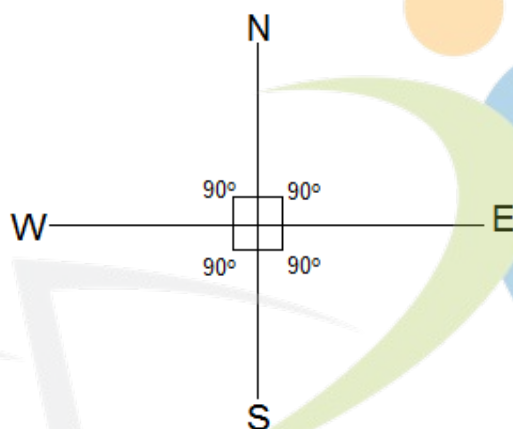### Chapter 5 – Lines and Angles

Class 7

In questions 1 to 41, there are four options out of which one is correct. Write the correct one.

1. The angles between North and West and South and East are

(a) complementary   (b) supplementary

(c) both are acute   (d) both are obtuse

Solution:-

(b) supplementary

The angle between North and West is 90º, angle between South and East is 90º as shown in the figure above. So, 90º + 90º = 180º.

Then, the angles between North and West and South and East are supplementary. When the sum of the measures of two angles is 180°, then the angles are called supplementary angles.

**2. Angles between South and West and South and East are**

(a) vertically opposite angles   (b) complementary angles

(c) making a linear pair   (d) adjacent but not supplementary

Solution:-

(c) making a linear pair

A linear pair is a pair of adjacent angles whose non-common sides are opposite rays.

3. In Fig. 5.9, PQ is a mirror, AB is the incident ray and BC is the reflected ray. If ∠ ABC = 46º, then ∠ ABP is equal to

Fig. 5.9
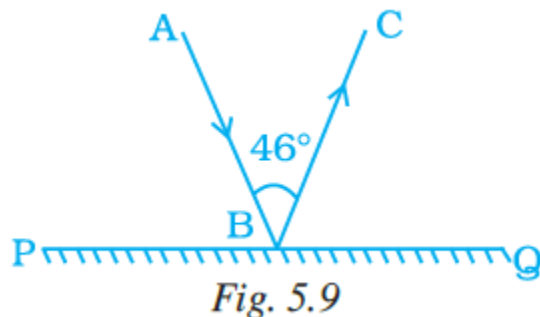
(a) 44°   (b) 67°   (c) 13°   (d) 62°

Solution:-

(b) 67°

As we know that, the angle formed by the incident ray and angle formed by the reflected ray is equal.

From the given figure,

PQ is a straight line,

So, ∠ABP + ∠ABC + ∠CBQ = 180°

Let us assume the ∠ABP = ∠CBQ = x

Then,

$x + 46° + x = 180°$

$2x + 46° = 180°$

$2x = 180° - 46°$

$2x = 134°$

$x = 134°/2$

$x = 67°$

Therefore, the ∠ABP = ∠CBQ = 67°

4. If the complement of an angle is 79°, then the angle will be of

(a) 1°   (b) 11°   (c) 79°   (d) 101°

Solution:-

(b) 11°

When the sum of the measures of two angles is 90°, the angles are called complementary angles. Each of them is called complement of the other.

The given complement of an angle is 79°

Let the measure of the angle be x°.

Then,

$x + 79° = 90°$

$x = 90° - 79°$

$x = 11°$

Hence, the measure of the angle is 11º.

5. Angles which are both supplementary and vertically opposite are
(a) 95º, 85º   **(b) 90º, 90º**   **(c) 100º, 80º**   **(d) 45º, 45º**
Solution:-
(b) 90º, 90º
When the sum of the measures of two angles is 180°, then the angles are called supplementary angles.

6. The angle which makes a linear pair with an angle of 61º is of
(a) 29º   **(b) 61º**   **(c) 122º**   **(d) 119º**
Solution:-
(d) 119º
A linear pair is a pair of adjacent angles whose non-common sides are opposite rays.
We know that, measure of sum of adjacent angles is equal to 180º.
Let the measure of other angle be xº.
Then,

$$x + 61º = 180º$$
$$x = 180º - 61º$$
$$x = 119º$$

7. The angles x and 90º – x are
(a) supplementary   **(b) complementary**
(c) vertically opposite   **(d) making a linear pair**
Solution:-
(b) complementary
When the sum of the measures of two angles is 90º, then the angles are called complementary angles.
$x + 90º - x = 90º$
$90º = 90º$
LHS = RHS

8. The angles x – 10º and 190º – x are
(a) interior angles on the same side of the transversal
(b) making a linear pair
(c) complementary
(d) supplementary

Solution:-

(d) supplementary

When the sum of the measures of two angles is 180º, then the angles are called supplementary angles.

$x - 10º + 190º - x = 180º$

$190º - 10 = 180º$

$180º = 180º$

LHS = RHS

9. In Fig. 5.10, the value of x is

Fig. 5.10

(a) 110º   **(b) 46º**   **(c) 64º**   **(d) 150º**

Solution:-

(d) 150º
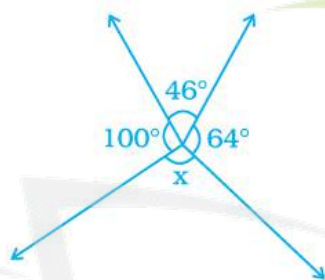
Sum of all angles about a point given in the figure are equal to 360º.

Then, $100º + 46º + 64º + x = 360º$

$\qquad 210º + x = 360º$

$\qquad x = 360º - 210º$

$\qquad x = 150º$

10. In Fig. 5.11, if AB || CD, ∠ APQ = 50º and ∠PRD = 130º, then ∠ QPR is
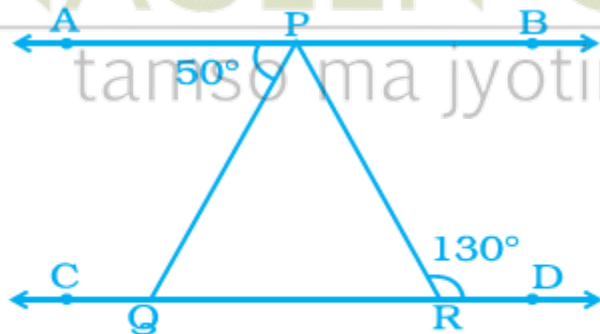
Fig. 5.11

(a) 130° **(b) 50°** **(c) 80°** **(d) 30°**

Solution:-

(c) 80°

We know that, ∠APR = ∠PRD   … [because interior alternate angles]

∠APQ + ∠QPR = 130°

50° + ∠QPR = 130°

∠QPR = 130° – 50°

∠QPR = 80°

11. In Fig. 5.12, lines l and m intersect each other at a point. Which of the following is false?

Fig. 5.12

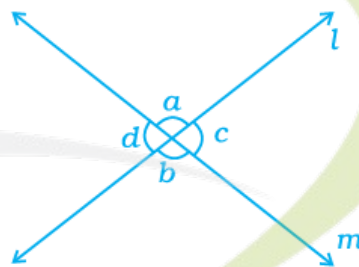**(a) ∠a = ∠b** **(b) ∠d = ∠c**

(c) ∠a + ∠d = 180° **(d) ∠a = ∠d**

Solution:-

(d) ∠a = ∠d

∠a ≠ ∠d

∠a = ∠b [because vertically opposite angles]

∠d = ∠c [because vertically opposite angles]

∠a + ∠d = 180° [Linear pair of angles]

12. If angle P and angle Q are supplementary and the measure of angle P is 60°, then the measure of angle Q is

(a) 120° **(b) 60°** **(c) 30°** **(d) 20°**

Solution:-

(a) 120°

When the sum of the measures of two angles is 180°, then the angles are called supplementary angles.

P + Q = 180°

60° + Q = 180°

Q = 180° – 60°

Q = 120°

13. In Fig. 5.13, POR is a line. The value of a is
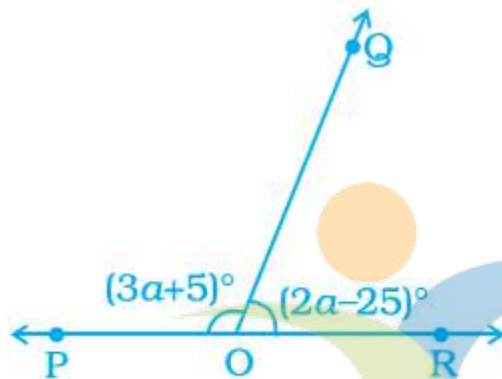

Fig. 5.13

(a) 40°   **(b) 45°**   **(c) 55°**   **(d) 60°**
Solution:-
(a) 40°
We know that, when the sum of the measures of two angles is 180°, then the angles are called supplementary angles.
$(3a + 5)° + (2a - 25)° = 180°$
$3a + 5 + 2a - 25 = 180°$
$5a - 20 = 180°$
$5a = 180° + 20$
$5a = 200$
$a = 200/5$
$a = 40°$

14. In Fig. 5.14, POQ is a line. If x = 30°, then ∠ QOR is
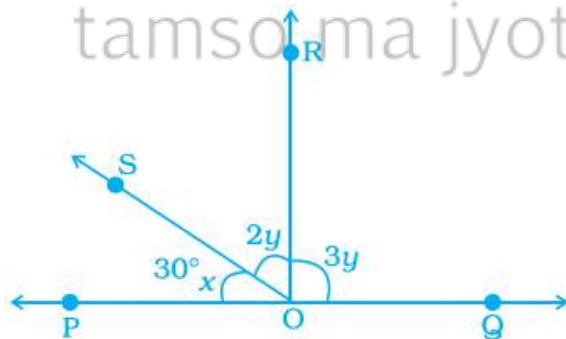

Fig. 5.14

(a) 90º   (b) 30º   (c) 150º   (d) 60º

Solution:-

(a) 90º

Sum of all angles about a straight line given in the figure are equal to 180º.

Then, $30º + 2y + 3y = 180º$

$\qquad 30º + 5y = 180º$

$\qquad 5y = 180º - 30º$

$\qquad 5y = 150º$

$\qquad y = 150/5$

$\qquad y = 30º$

So, $2y = 2 \times 30 = 60º$

$\quad 3y = 3 \times 30 = 90º$

Therefore, $\angle QOR = 90º$

15. The measure of an angle which is four times its supplement is

(a) 36º   (b) 144º   (c) 16º   (d) 64º

Solution:-

(b) 144º

We know that, when the sum of the measures of two angles is 180º, then the angles are called supplementary angles.

Let us assume the angle be x.

Then, its supplement angle = (180º - x)

As per the condition given in the question, $x = 4 (180º - x)$

$\qquad\qquad\qquad\qquad x = 720º - 4x$

$\qquad\qquad\qquad\qquad x + 4x = 720º$

$\qquad\qquad\qquad\qquad 5x = 720º$

$\qquad\qquad\qquad\qquad x = 720º/5$

$\qquad\qquad\qquad\qquad x = 144º$

16. In Fig. 5.15, the value of y is

Fig. 5.15

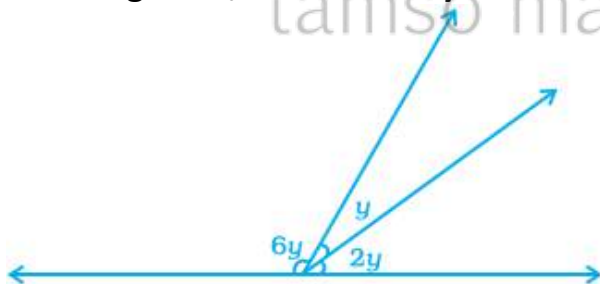**(a) 30°**   **(b) 15°**   **(c) 20°**   **(d) 22.5°**

Solution:-

(c) 20°

Sum of all angles about a straight line given in the figure are equal to 180°.

Then, $6y + y + 2y = 180°$

$9y = 180°$

$y = 180/9$

$y = 20°$

So, value of y is 20°.

17. In Fig. 5.16, PA || BC || DT and AB || DC. Then, the values of a and b are respectively.
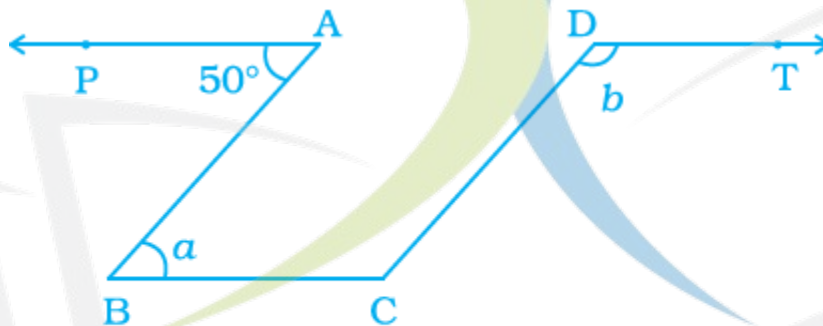
Fig. 5.16

(a) 60°, 120°   **(b) 50°,130°**   **(c) 70°,110°**   **(d) 80°,100°**

Solution:-

(b) 50°,130°

We know that, ∠PAB = ∠ABC = 50°   … [because interior alternate angles]

Given, AB || DC so consider it as parallelogram,

In parallelogram adjacent angles of a parallelogram are supplementary.

So, ∠ABC + ∠BCD = 180°

$50° + ∠BCD = 180°$

$∠BCD = 180° – 50°$

$∠BCD = 130°$

∠BCD = ∠CDT = 130°   … [because interior alternate angles]

Therefore, a = 50° and b = 130°

18. The difference of two complementary angles is 30°. Then, the angles are

(a) 60°, 30°   **(b) 70°, 40°**   **(c) 20°, 50°**   **(d) 105°, 75°**

Solution:-

(a) 60º, 30º

When the sum of the measures of two angles is 90º, then the angles are called complementary angles.

So, 60º + 30º = 90º

As per the condition in the question, 60º – 30º = 30º

19. In Fig. 5.17, PQ || SR and SP || RQ. Then, angles a and b are respectively
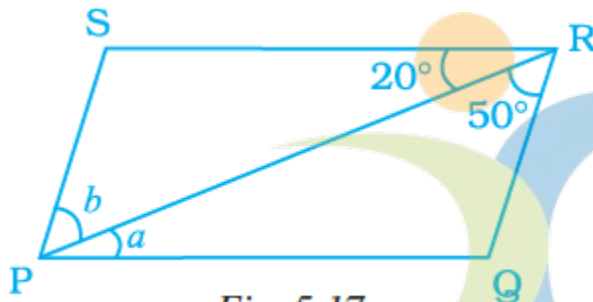
Fig. 5.17

(a) 20º, 50º   **(b) 50º, 20º**   **(c) 30º, 50º**   **(d) 45º, 35º**

Solution:-

(a) 20º, 50º

∠QRP = ∠RPS = 50º   … [because interior alternate angles]

∠SRP = ∠RPQ = 20º   … [because interior alternate angles]

Therefore, angle a = 20º and angle b = 50º

20. In Fig. 5.18, a and b are

Fig. 5.18

(a) alternate exterior angles

(b) corresponding angles

(c) alternate interior angles

(d) vertically opposite angles

Solution:-

(c) alternate interior angles

21. If two supplementary angles are in the ratio 1: 2, then the bigger angle is
(a) 120°   **(b) 125°**   **(c) 110°**   **(d) 90°**
Solution:-
(a) 120°
We know that, when the sum of the measures of two angles is 180°, then the angles are called supplementary angles.
Let us assume two angles be 1x and 2x.
$1x + 2x = 180°$
$3x = 180°$
$x = 180°/3$
$x = 60°$
Then the bigger angle is $2x = 2 \times 60° = 120°$

22. In Fig. 5.19, ∠ROS is a right angle and ∠POR and ∠QOS are in the ratio 1: 5. Then, ∠QOS measures

Fig. 5.19
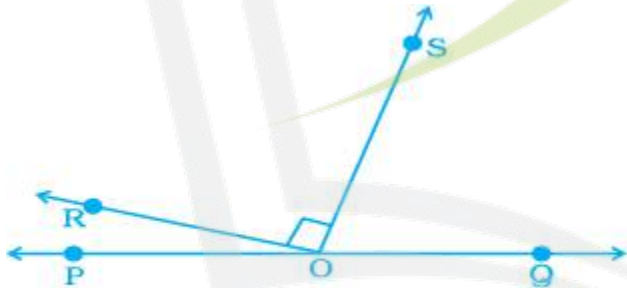
(a) 150°   **(b) 75°**   **(c) 45°**   **(d) 60°**
Solution:-
(b) 75°
Sum of all angles about a straight line given in the figure are equal to 180°.
Given, ∠ROS is a right angle = 90°
Let us assume ∠POR = x and ∠QOS = 5x.
Then, ∠POR + ∠ROS + ∠QOS = 180°
          $x + 90° + 5x = 180°$
          $6x = 180° - 90°$
          $6x = 90°$
          $x = 90°/6$
          $x = 15°$

So, ∠QOS measures = 5x = 5 × 15º = 75º

23. Statements a and b are as given below:
a : If two lines intersect, then the vertically opposite angles are equal.
b : If a transversal intersects, two other lines, then the sum of two interior angles on the same side of the transversal is 180º.
Then
(a) Both a and b are true   **(b) a is true and b is false**
(c) a is false and b is true   **(d) both a and b are false**
Solution:-
(b) a is true and b is false

24. For Fig. 5.20, statements p and q are given below:
p : a and b are forming a linear pair.
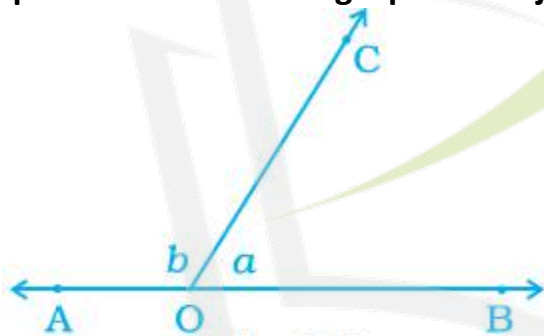**q : a and b are forming a pair of adjacent angles.**

Fig. 5.20

Then,
(a) both p and q are true
(b) p is true and q is false
(c) p is false and q is true
(d) both p and q are false
Solution:-
(a) both p and q are true

25. In Fig. 5.21, ∠AOC and ∠ BOC form a pair of
(a) vertically opposite angles
(b) complementary angles
(c) alternate interior angles
(d) supplementary angles

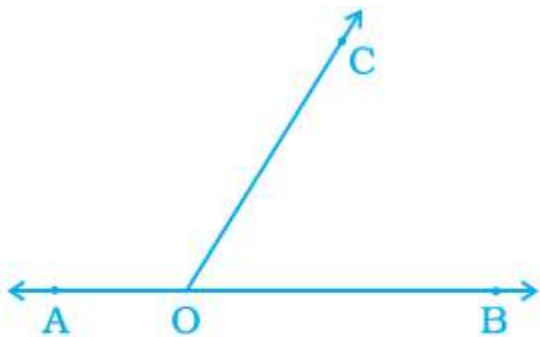Fig. 5.21

Solution:-
(d) supplementary angles
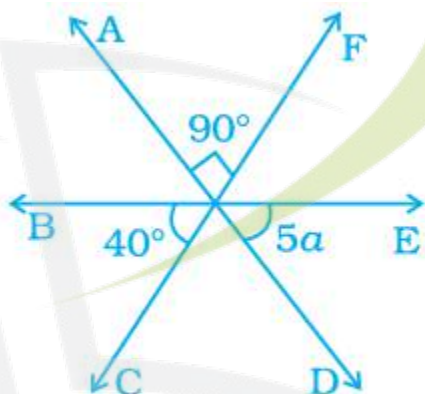
26. In Fig. 5.22, the value of *a* is

Fig. 5.22

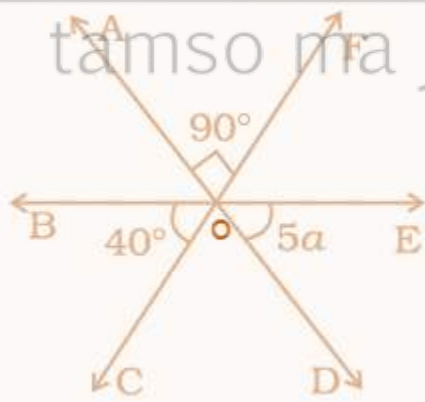(a) 20º   (b) 15º
(c) 5º   (d) 10º

Solution:-
(d) 10º

∠AOF = ∠COD = 90°   [because vertically opposite angles]
Sum of all angles about a straight line given in the figure are equal to 180°.
Then, ∠BOC + ∠COD + ∠DOE = 180°
        40° + 90° + 5a = 180°
        130° + 5a = 180°
        5a = 180° − 130°
        5a = 50°
        a = 50/5
        a = 10°

27. In Fig. 5.23, if QP || SR, the value of a is
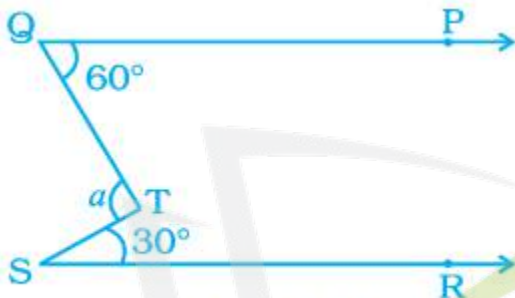

Fig. 5.23

(a) 40°   (b) 30°   (c) 90°   (d) 80°
Solution:-
(c) 90°
To find out the value of 'a', draw a line XY, to cut at 'a'.

So, XY || SR
∠XTS = ∠TSR = 30°   … [because interior alternate angles]
∠PQT = ∠QTX = 60°   … [because interior alternate angles]
Then, a = ∠XTS + ∠QTX
        = 30° + 60°
        = 90°

28. In which of the following figures, a and b are forming a pair of adjacent angles?
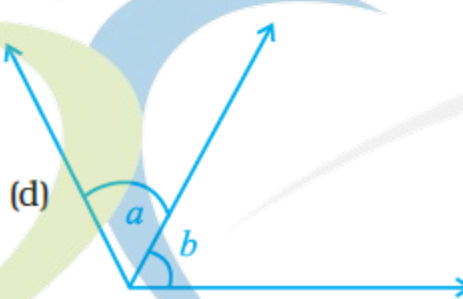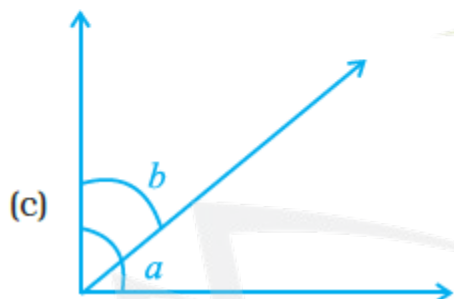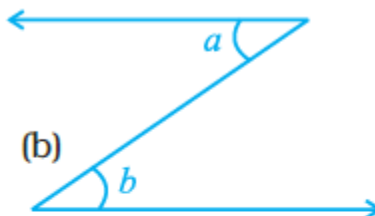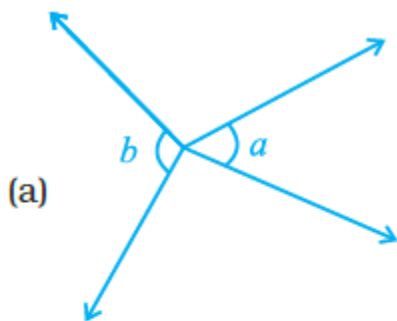
Solution:-
In figure (d) a and b are forming a pair of adjacent angles.

29. In a pair of adjacent angles, (i) vertex is always common, (ii) one arm is always common, and (iii) uncommon arms are always opposite rays
Then
(a) All (i), (ii) and (iii) are true
(b) (iii) is false
(c) (i) is false but (ii) and (iii) are true
(d) (ii) is false
Solution:-
(b) (iii) is false
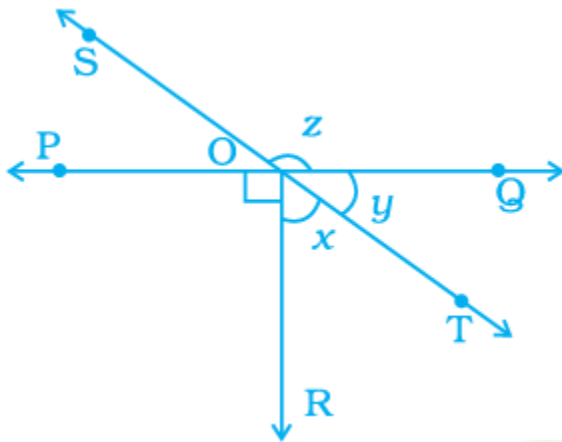Two angles are called adjacent angles, if they have a common vertex and a common arm but no common interior points.

30. In Fig. 5.25, lines PQ and ST intersect at O. If ∠POR = 90° and x : y = 3 : 2, then z is equal to
(a) 126°   **(b) 144°**   **(c) 136°**   **(d) 154°**

Solution:-

(b) 144°

Sum of all angles about a straight line given in the figure are equal to 180°.

PQ is a straight line.

Then, ∠POR + ∠ROT + ∠TOQ = 180°

Given, x : y = 3 : 2

Let us assume x = 3a, y = 2a

$\quad$ 90° + 3a + 2a = 180°

$\quad$ 90° + 5a = 180°

$\quad$ 5a = 180° − 90°

$\quad$ 5a = 90°

$\quad$ a = 90/5

$\quad$ a = 18°

So, x = 3a = 3 × 18 = 54°

$\quad$ y = 2a = 2 × 18 = 36°

From the figure SOT is a straight line,

Then, z+ y = 180°

$\quad$ z + 36° = 180°

$\quad$ z = 180° − 36°

$\quad$ z = 144°

31. In Fig. 5.26, POQ is a line, then a is equal to

(a) 35° $\qquad$ **(b) 100°** $\qquad$ **(c) 80°** $\qquad$ **(d) 135°**
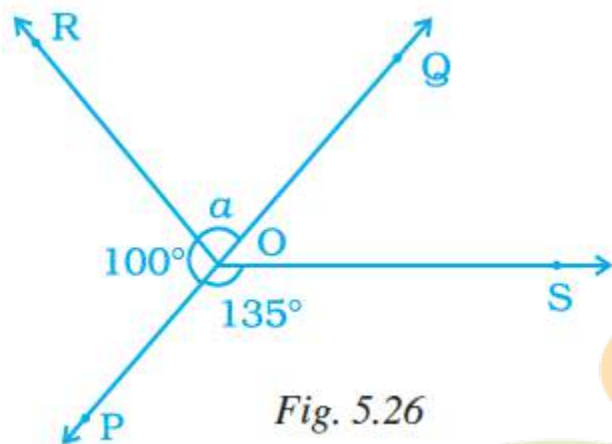
Fig. 5.26

Solution:-
(c) 80°
From the figure POQ is a straight line,
Then, 100 + a = 180°
$\quad$ a = 180° − 100
$\quad$ a= 80°

32. Vertically opposite angles are always
(a) supplementary$\qquad\qquad$**(b) complementary**
(c) adjacent$\qquad\qquad$**(d) equal**
Solution:-
(d) equal

33. In Fig. 5.27, a = 40°. The value of b is
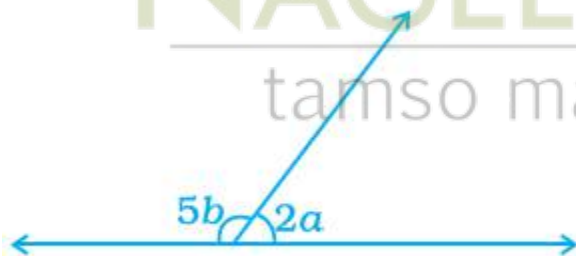**(a) 20°**$\qquad$**(b) 24°**$\qquad$**(c) 36°**$\qquad$**(d) 120°**

Fig. 5.27

Solution:-
(a) 20°
Given, a = 40°

Then, 2a = 2 × 40 = 80°

From the figure, angles formed on the straight line are equal to 180°,

Then, 5b + 2a = 180°

$\quad\quad$ 5b + 80° = 180°

$\quad\quad$ 5b= 180° - 80°

$\quad\quad$ 5b = 100°

$\quad\quad$ b = 100/5

$\quad\quad$ b = 20°

34. If an angle is 60° less than two times of its supplement, then the greater angle is

(a) 100° $\quad\quad\quad$ **(b) 80°** $\quad\quad\quad$ **(c) 60°** $\quad\quad\quad$ **(d) 120°**

Solution:-

(a) 100°

Let us assume the angle be P.

Then, its supplement is 180° – P

As per the condition in the question,

P = 2(180° - P) – 60°

P = 360° – 2P – 60°

P + 2P = 300°

3P = 300°

P = 300/3

P = 100°

So, its supplement is 180° – P = 180° – 100° = 80°

Therefore, the greater angle is 100°.

35. In Fig. 5.28, PQ || RS. If ∠1=(2a+b)° and ∠6=(3a–b)°, then the measure of ∠2 in terms of b is

(a) (2+b)° $\quad\quad\quad$ **(b) (3–b)°** $\quad\quad\quad$ **(c) (108–b)°** $\quad\quad\quad$ **(d) (180–b)°**

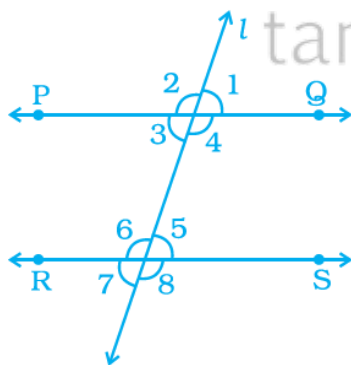*Fig. 5.28*

Solution: -

(c) (108–b)°

From the question it is given that, $\angle 1 = (2a + b)°$ and $\angle 6 = (3a - b)°$

Since $\angle 5$ and $\angle 6$ forms a linear pair of angles

Then,

$\angle 5 = (180-3a + b)°$ … [equation 1]

$\angle 5 = \angle 1 = (180-3a + b)°$ [Because Corresponding angles]   …equation (2)

From equation (2) we get,

$2a + b = 180-3a + b$

$5a = 180$

$a = 36°$

Since $\angle 1$ and $\angle 2$ forms a linear pair so

$\angle 2 = 180°- 2a-b$

Substituting the value of a

$\angle 2 = 180°- 72° - b$

$\angle 2 = 108°- b$

36. In Fig. 5.29, PQ||RS and a : b = 3 : 2. Then, f is equal to
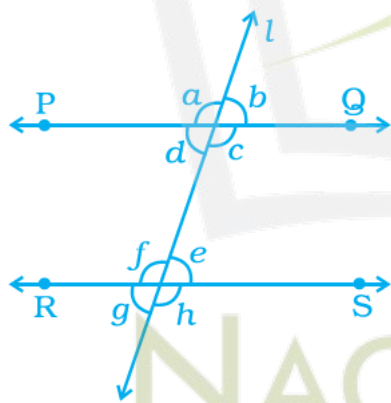

Fig. 5.29

(a) 36°   (b) 108°   (c) 72°   (d) 144°

Solution: -

(b) 108°

From the figure, PQ||RS.

From the question it is given that, a: b = 3: 2

So, let us assume a = 3m and b = 2m

We know that, sum of angles on the straight line is equal to 180°

Then, $\angle a + \angle b = 180°$

$$3m + 2m = 180^o$$
$$5m = 180^o$$
$$m = 180^o/5$$
$$m = 36^o$$

So, $a = 3m = 3 \times 36^o = 108^o$

$b = 2m = 2 \times 36^o = 72$

Therefore, $\angle a = \angle f = 108^o$ [because corresponding angles]

37. In Fig. 5.30, line l intersects two parallel lines PQ and RS. Then, which one of the following is not true?
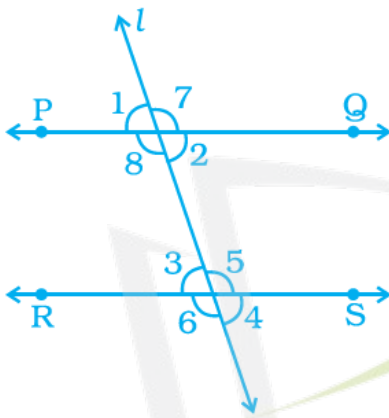

Fig. 5.30

(a) $\angle 1 = \angle 3$ **(b)** $\angle 2 = \angle 4$

(c) $\angle 6 = \angle 7$ **(d)** $\angle 4 = \angle 8$

Solution:-

(d) $\angle 4 = \angle 8$

Because, $\angle 4 \neq \angle 8$

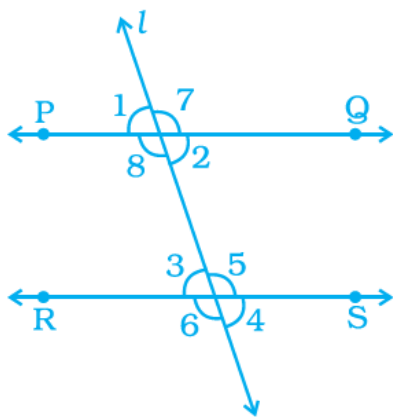**38. In Fig. 5.30, which one of the following is not true?**

Fig. 5.30

(a) ∠1 + ∠5 = 180⁰
(b) ∠2 + ∠5 = 180⁰
(c) ∠3 + ∠8 = 180⁰
(d) ∠2 + ∠3 = 180⁰
Solution:-
(d) ∠2 + ∠3 = 180⁰
We know that, interior opposite angles are equal
∠2 = ∠3

39. In Fig. 5.30, which of the following is true?

Fig. 5.30

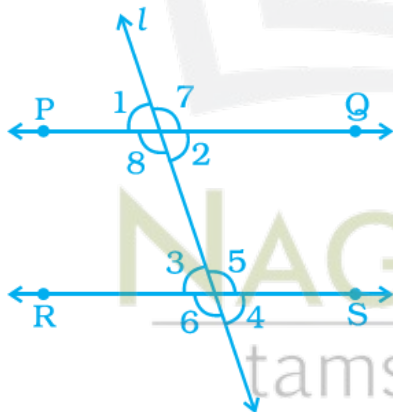**(a) ∠1 = ∠5**   **(b) ∠4 = ∠8**   **(c) ∠5 = ∠8**   **(d) ∠3 = ∠7**
Solution:-
(c) ∠5 = ∠8
From the figure, PQ||RS
∠5 = ∠8   [interior alternate angles are equal]

40. In Fig. 5.31, PQ||ST. Then, the value of x + y is

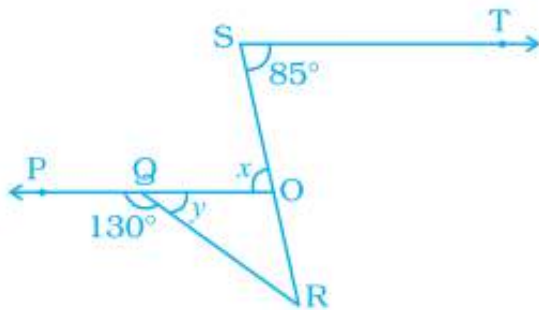(a) 125º   (b) 135º   (c) 145º   (d) 120º

Fig. 5.31

Solution: -

(b) 135º

From the figure, PO is a straight line

We know that, sum of angles on the straight is equal to 180º.

Then,

$y + \angle PQR = 180^0$

$y + 130^0 = 180^0$

$y = 50^o$

Then,

$\angle QOS = \angle TSO$ [Co-interior angle]

$x = 85^0$

$x + y = 135$

41. In Fig. 5.32, if PQ||RS and QR||TS, then the value a is
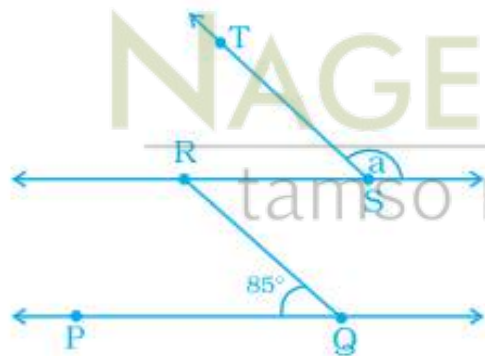

Fig. 5.32

(a) 95º   (b) 90º   (c) 85º   (d) 75º

Solution:-

(a) 95º

We know that, corresponding angles are equal
So,
$\angle$ RQP = $\angle$ TSR = 85^0 (Corresponding angles)
a + $\angle$ TSR = 180^0
$\angle$a = 95

In questions 42 to 56, fill in the blanks to make the statements true.
42. If sum of measures of two angles is 90º, then the angles are _____.
Solution:-
If sum of measures of two angles is 90º, then the angles are <u>complementary</u>.

43. If the sum of measures of two angles is 180º, then they are _____.
Solution:-
If the sum of measures of two angles is 180º, then they are <u>supplementary</u>.

44. A transversal intersects two or more than two lines at _____ points.
Solution:-
A transversal intersects two or more than two lines at <u>distinct</u> points.

If a transversal intersects two parallel lines, then (Q. 45 to 48).
45. sum of interior angles on the same side of a transversal is _____.
Solution:-
Sum of interior angles on the same side of a transversal is <u>180º</u>.

46. Alternate interior angles have one common _____.
Solution:-
Alternate interior angles have one common <u>arm</u>.

47. Corresponding angles are on the _____ side of the transversal.
Solution:-
Corresponding angles are on the <u>same</u> side of the transversal.

48. Alternate interior angles are on the _____ side of the transversal.
Solution:-
Alternate interior angles are on the <u>opposite</u> side of the transversal

49. Two lines in a plane which do not meet at a point anywhere are called _____ lines.

Solution:-

Two lines in a plane which do not meet at a point anywhere are called <u>parallel</u> lines.

50. Two angles forming a _____ pair are supplementary.
Solution:-

Two angles forming a <u>linear</u> pair are supplementary.

51. The supplement of an acute is always _____ angle.
Solution:-

The supplement of an acute is always <u>obtuse</u> angle.

52. The supplement of a right angle is always _____ angle.
Solution:-

The supplement of a right angle is always <u>right</u> angle.

53. The supplement of an obtuse angle is always _____ angle.
Solution:-

The supplement of an obtuse angle is always <u>acute</u> angle.

54. In a pair of complementary angles, each angle cannot be more than _____.
Solution:-

In a pair of complementary angles, each angle cannot be more than <u>90°</u>.

55. An angle is 45°. Its complementary angle will be _____ .
Solution:-

An angle is 45°. Its complementary angle will be <u>45°</u>.

56. An angle which is half of its supplement is of _____.
Solution:-

An angle which is half of its supplement is of <u>60°</u>.

Let us assume the angle be p, and supplement be 2p

$p + 2p = 180^0$

$3p = 180^0$

$p = 60^0$

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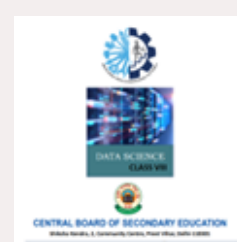
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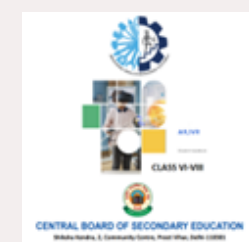
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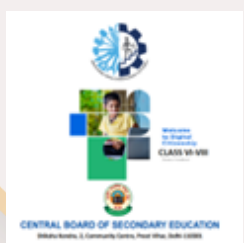
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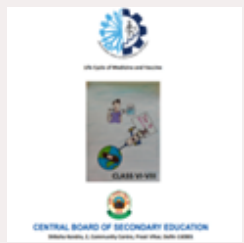
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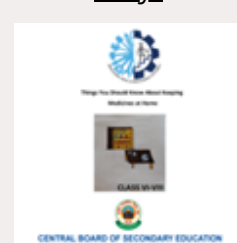
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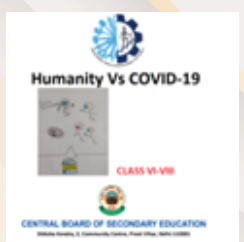
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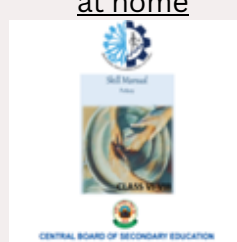
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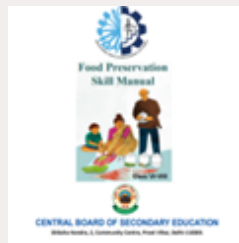
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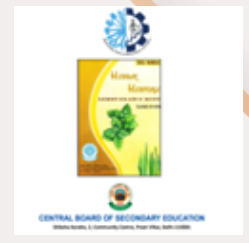
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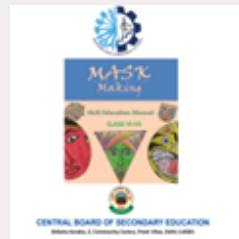
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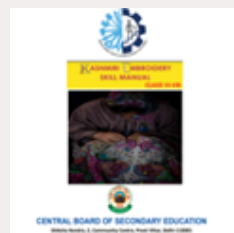
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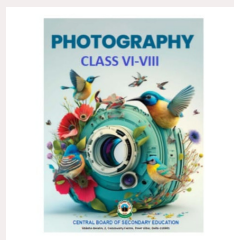
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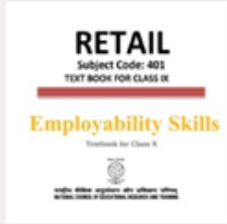
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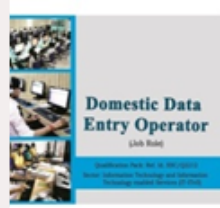
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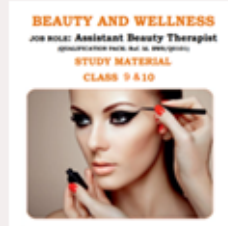
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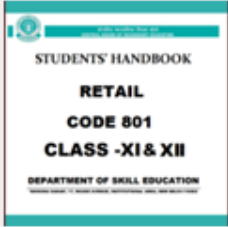
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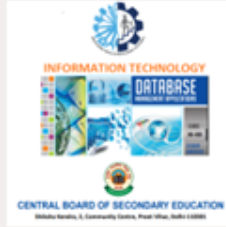
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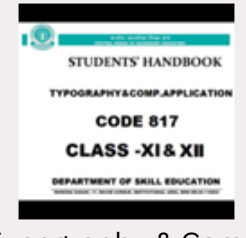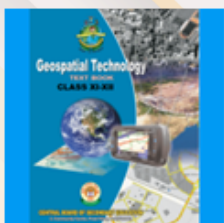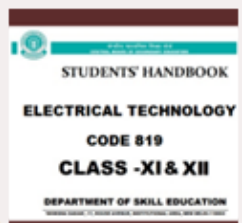
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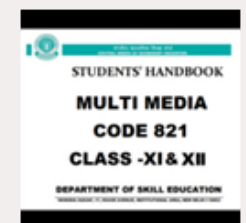
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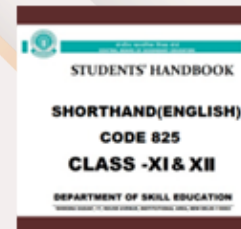Electrical Technology

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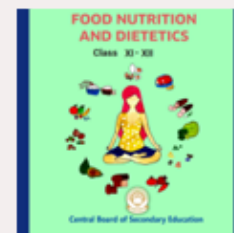
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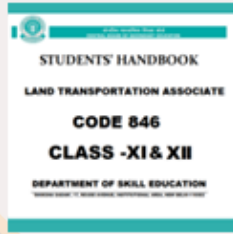Applied Mathematics

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